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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,691	03/16/2004	Paul Edward Voglewede	HAR65 031	1768

7590 09/19/2007

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EXAMINER	
FOTAKIS, ARISTOCRATIS	
ART UNIT	**PAPER NUMBER**
2611	

MAIL DATE	DELIVERY MODE
09/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/800,691	VOGLEWEDE, PAUL EDWARD	
	Examiner	Art Unit	
	Aristocratis Fotakis	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03/16/2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 7, 10 - 13, 15 - 22, 25, 27 - 35, 38 - 39, 48 - 50, 52 - 55, 60 - 61* is/are rejected.

7)☒ Claim(s) *8 – 9, 14, 23 – 24, 26, 36 – 37, 40, 42 – 47, 51, 56 – 59* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03/16/2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/03/2004, 07/09/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81(c). No new matter may be introduced in the required drawing. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). Claim 54 recites a receiver which is not shown in the drawings.

Specification

The disclosure is objected to because of the following informalities: Typing informalities have been observed in equation 1, "h_2" (Paragraph (0025), Line13), "hop frame 100" (Paragraph (0026), Line 3 – 4) and "Data symbol 104" (Paragraph 0030, Line 2 – 3). Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 41 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 41 recites the limitation "the third sequence" in Line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 38 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. A hopping frame as claimed is non-statutory subject matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1 – 7, 10, 12, 15 – 19, 22, 27 – 29, 30 – 32, 35, 38 – 39, 49, 52, 54 – 55, and 60 - 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho et al (US 5,712,877) in view of Miller et al. ("An innovative synchronization preamble for UHF MILSATCOM", Military Communications Conference Proceedings, 1999. MILCOM 1999. IEEE, Volume 2, 31-Oct. to 3-Nov.1999). and in further view of Kim et al. ("*Antijamming performance of slow FH-CPM signals with concatenated coding and jamming estimation*" Military Communications Conference, 2003. MILCOM 2003. IEEE Volume 2, 13-16 Oct. 2003 Page(s): 1120 – 1125, Vol.2).

Re claims 1 and 52, Ho teaches of a method of transmitting data as a continuous phase modulation waveform (Abstract, Lines 1 - 8) with a modulation index (h, Col 3, Line 8), comprising the steps of: generating a plurality of data frames from the data (Col 2, Lines 38 – 49); for each data frame, coding the data into a sequence of symbols wherein the initial phase state is zero (φ_o = 0, Col 6, Lines 64 – 67), and appending a plurality of other symbols (Pilot, Fig.6) to the sequence of symbols to form

a frame wherein the final phase state of the frame is zero (Col 6, Lines 58 – 60 and Col 7, Lines 15 – 20); modulating a fixed frequency carrier with the sequence of symbols for each frame with a repeated sequence (even to odd, Col 3, Lines 7 – 15) comprised of modulation index (Col 7, Lines 1 – 27); and, transmitting the modulated frame (Fig.1). However, Ho does not teach of a set of multiple modulation indices (multi-h) and frequency hopping.

Miller teaches of multi-h Continuous Phase Modulation (CPM) having been added to MIL-STD-188-181B for dedicated mode UHF SATCOM operation to provide greater throughput capacity for this power- and bandwidth-restricted communications network. However, Miller does not teach of frequency hopping used in CPM (Abstract).

Kim teaches of a slow frequency-hopping spread spectrum system with trellis-coded interleaved CPM where the phase is continuous during each hop interval (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a set of multiple modulation indices to lead to an increase of the minimum Euclidean distance to provide greater throughput capacity (Miller, Abstract) and use of frequency hopping with CPM for its power and bandwidth efficient anti-jam capability (Kim, Abstract).

Re claim 3, Ho teaches of the set of modulation indices includes odd and even modulation indices (Col 6, Lines 64 – 67, Eq.14) and the odd modulation index is used first (Eq.15, Col 7, Lines 8 – 27).

Re claims 4 and 32, Ho teaches of the phase states represented by the symbols in the hopping frame proceed in a repeated sequence of even state, odd state, odd state and even state (Col 3, Lines 4 – 15 and Col 4, Lines 10 – 25, Eq.6).

Re claims 5, 22, 49 and 61, Ho, Miller and Kim teach all the limitations of claim 1. However, Kim and Sasase do not teach of interleaved sequence of symbols over plural hopping frames.

Kim teaches of interleaving where a block channel is interleaved followed by a frequency hopper to distribute the modulated sequence across different frequency bands (Page 1120, Col 2) and deinterleaved in the receiver (Page 1122, end of Col 2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used interleaving to improve error performance. (Page 1123, End of page).

Re claims 12 and 25, Ho teaches of trellis coding (Col 1, Lines 50 – 54).

Re claims 15 – 17 and 27 - 29, Ho teaches of the frame and transition period (transitions even to odd) combined is N symbols in length wherein the first K symbols are data symbols (Col 2, lines 38 – 49) and the kth symbol is a pilot symbol (Eq.16).

Re claim 18 and 30, Ho, Miller and Kim teach all the limitations of claim 1. However, Kim does not teach of the other symbols including a plurality of flush symbols selected from the sequence of symbols.

Miller teaches of 4-ary, multi-h Continuous Phase Modulation (CPM) has been added to MIL-STD-188-181B for dedicated mode UHF SATCOM operation to provide greater throughput capacity for this power- and bandwidth-restricted communications network (Abstract). Miller teaches of the use of 6 flush bits to conclude the 36 bits of configuration data (plurality of other symbols, Fig.1). The purpose of the flush bits is twofold: a) return the modulator to a known phase state, and b) allow some time for the receiver to process the header.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used flush bits in order to return the modulator to a known phase state zero.

Re claims 19 and 31, Ho teaches of the continuous phase modulation waveform being rotationally invariant (Eq.14, product of πh).

Re claims 6 and 54, Ho teaches of a method and system of receiving a data signal transmitted as a continuous phase modulation waveform with modulation indices (h, Col 3, Line 8), wherein the data signal is comprised of a plurality of frames (Col 2, Lines 38 – 49), comprising the steps of: (i) demodulating (#18, Fig.1) one of the frames at a determined frequency and phase offset (Col 9, Lines 37 – 50) with a repeated sequence (even to odd, Col 3, Lines 7 – 15) formed from the modulation indices (Col 7, Lines 1 – 27) to obtain a set of demodulated data symbols (DATA, Fig.6) and a set of demodulated other symbols (PILOT, Fig.6) for each frame (Col 2, Lines 57 – 67, also see claim 1); (ii) decoding (#20, Fig.1) the set of demodulated data symbols beginning at state "zero" to recover the data and decoding the set of other symbols to return to the zero phase state (Col 2, Lines 65 – 67, see claim 1). However, Ho does not teach of a set of modulation indices and frequency hopping.

Miller teaches of multi-h Continuous Phase Modulation (CPM) having been added to MIL-STD-188-181B for dedicated mode UHF SATCOM operation to provide greater throughput capacity for this power- and bandwidth-restricted communications network. However, Miller does not teach of frequency hopping used in CPM.

Kim teaches of a slow frequency-hopping spread spectrum system with trellis-coded interleaved CPM where the phase is continuous during each hop interval (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a set of multiple modulation indices to lead to an increase of the minimum Euclidean distance to provide greater throughput capacity (Miller, Abstract) and use of frequency hopping with CPM for its power and bandwidth efficient anti-jam capability (Kim, Abstract).

Re claims 7 and 55, Ho teaches of demodulating (Viterbi Demod #18, Fig.1) the hopping frame synchronously at a plurality (covariance matrix and Eq.33) of predetermined phase offsets (estimation error, Col 9, Lines 30 – 65).

Re claim 10, Ho teaches of the set of modulation indices including odd and even modulation indices (Col 7, Lines 1 – 35) and the odd modulation index is used first (Eq.15).

Re claims 35 and 60, Ho teaches of Viterbi decoding (#20, Fig.1).

Re claims 38, Ho teaches of a frame for transmitting data in a single-modulation indice (h, Col 3, Line 8) continuous phase modulation waveform (Abstract, Lines 1 - 8), comprising: a predetermined number of symbol periods (Col 2, Lines 38 – 49); a first sequence of trellis coded symbols (DATA, Fig.6) containing the transmitted data wherein the initial phase state is zero ($\varphi_o = 0$, Col 6, Lines 64 – 67), and the first symbol of the first sequence is located in the first symbol period (Fig.6). However, Ho does not teach of a set of multiple modulation indices (multi-h), a second sequence wherein the number of symbols in the second sequence is equal to the constraint length and frequency hopping.

Miller teaches of multi-h Continuous Phase Modulation (CPM) having been added to MIL-STD-188-181B for dedicated mode UHF SATCOM operation to provide greater throughput capacity for this power- and bandwidth-restricted communications network (Abstract). Miller further teaches of the use of 6 flush bits to conclude the 36 bits of configuration data (second sequence, Fig.1). The purpose of the flush bits is twofold: a) return the modulator to a known phase state, and b) allow some time for the receiver to process the header. It would be inherent to say that the second sequence is equal to the constraint length defined by the multiple modulation indices (applicants prior art, Paragraph 0005). The first symbol of the second sequence is adjacent to the last symbol of the first sequence (12 information bits, Page 1341, Col 1, Paragraph 2, Fig.1), wherein the number of symbols in the first and second sequence combined are not greater than the fixed number of symbol periods (Fig.1). However, Miller does not teach of frequency hopping used in CPM.

Kim teaches of a slow frequency-hopping spread spectrum system with trellis-coded interleaved CPM where the phase is continuous during each hop interval (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a set of multiple modulation indices to lead to an increase of the minimum Euclidean distance to provide greater throughput capacity (Miller, Abstract), provide flush bits so as to return the modulator to a known phase state and use of frequency hopping with CPM for its power and bandwidth efficient anti-jam capability (Kim, Abstract).

Re claim 39, Ho teaches of the last symbol of the first sequence is a pilot symbol (Fig.6, PILOT, Col 3, Lines 25 – 45).

Claims 13 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho, Sasase and Kim as applied to claim 12 above, and further in view of Toptchiyski et al ("*Performance Testing of a Concatenated RS-Convolutional Encoding Scheme in AWGN and Impulse Noise channels*" Wire Communications Laboratory, Department of Electrical Enginnering and Computer Technology, University of Patras, Greece, 1999 IEEE).

Ho, Miller and Kim teach all the limitations of claims 1 and 38. However, Kim and Miller do not teach of Reed-Solomon coding.

Toptchiyski teaches of a Reed Solomon – convolutional encoder scheme. The role of the inner code is undertaken by a convolutional encoder, which protects the outer one from random errors, while the RS code is responsible for the correction of burst errors (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a Reed Solomon Encoder for protection against errors.

Claims 20 – 21, 33 - 34 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho, Miller and Kim as applied to claims 1 above, and further in view of Sasase et al. (*"Multi-h Phase-Coded Modulation"*, IEEE Communications magazine, December 1991).

Ho, Miller and Kim teach all of the limitations of claims 1 and 6 as well as wherein there are 2M valid phase states. However, Ho, Miller and Kim do not teach of the set of modulation indices selected from the group consisting of 4/16 and 5/16, 5/16 and 6/16, 6/16 and 7/16, and 12/16 and 13/16.

Sasase teaches of the multi-h codes summarized in terms of coding gain, normalized 95, 99, 99.5 percent bandwidths and the required decision depth in Tables 1,2 and 3 respectively.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used summarized tables of the multi-h codes to make comparisons and select the most appropriate multi-h code.

Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller in view of Kim.

Miller teaches of a method of communicating data with a multiple modulation index continuous phase modulation waveform as trellis coded symbols in data frames, the improvement of increasing the data payload of the data frames (Abstract) comprising the steps of: receiving and decoding (Viterbi, Chapter 4, Header) each data frame independently of the previous data frame without pilot symbols (pilot symbols are not used, Fig.1). However, Miller does not teach of frequency hopping used in CPM (Abstract).

Kim teaches of a slow frequency-hopping spread spectrum system with trellis-coded interleaved CPM where the phase is continuous during each hop interval (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use of frequency hopping with CPM for its power and bandwidth efficient anti-jam capability (Kim, Abstract).

Allowable Subject Matter

Claims 8 – 9, 14, 23 – 24, 26, 36 – 37, 40, 42 – 47, 51, 56 – 59 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aristocratis Fotakis whose telephone number is (571) 270-1206. The examiner can normally be reached on Monday - Thursday 7 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AF

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER